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SCIENCE NEWS LETTER

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MILITARY SCIENCE

No USSR A-Bomb to China

➤ IF COMMUNIST CHINA wants the atomic bomb, it will have to build its own, without help from Soviet Russia or any of the industrially advanced Soviet satellites, the Institute for the Study of the USSR declared in Munich, Germany.

There are no signs that an atomic bomb has been built or tested in China, A. Kashin in the Institute Bulletin, 8:17, 1961, reports. There is no concrete evidence to show that the two countries are collaborating on production of nuclear weapons, or that the Soviets have offered to supply China with the necessary aircraft or missiles to make them effective.

China's industry is too primitive for a nuclear weapons program without the aid that Soviet leaders "seem reluctant to provide," Mr. Kashin states.

China lacks both money and materials, and is hard-pressed to maintain its present level of industrial production while trying to pay for grain imported from Canada and Australia.

Meanwhile, Chinese propagandists attempt to convince the army and the people that if war comes, an enemy armed with nuclear weapons and rockets would have no real advantage over conventionally equipped Chinese forces.

Chang Chieh, a Communist leader, has referred to atom bombs as "paper tigers" used by "American reactionaries" to frighten people. Chinese Defense Minister Ling Piao has urged his countrymen to concentrate on forging "a spiritual atomic bomb," based on "man's ideological consciousness and courage," which he said would be more useful and powerful than a real one.

Mr. Kashin recalls that pre-1949 Soviet propaganda, in the days before Russia had the bomb, also took the line of belittling nuclear weapons and denying that they could have any overall effect on the course of a new world war.

Mr. Kashin says Western observers have been wrong in predicting, as they have done since the early 1950's, that Communist China might be ready to explode an atomic bomb at any time.

He notes, however, that lack of capable scientists is not a factor. Researchers now working in China include a number of native nuclear and rocket experts, some trained in the United States, as well as foreign experts.

The Institute is made up of refugee Soviet scholars with the announced aim of providing "reliable information" on current Soviet trends and conditions.

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MEDICINE

New Clues to "Blue Baby"

➤ NEW CLUES to "blue baby" condition and its treatment may result from an experimental demonstration of how the infant's circulation changes following its first breath.

Dr. Nicholas Assali and associates of the University of California, Los Angeles, Medical School have demonstrated for the first time a long suspected relationship between pressure in blood vessels leading from the heart and blood flow patterns in these vessels before and after birth. The study was supported by the Los Angeles County Heart Association.

Since the unborn baby (fetus) does not utilize its lungs but obtains its oxygen from its mother's blood, its pattern of blood flow differs from that which takes place after birth.

The pulmonary artery, leading from the heart's right side to the lungs, carries only a small fraction of blood to lung tissue. The larger portion passes to a special channel, the ductus arteriosus, which shunts blood from the pulmonary artery to the aorta, the main artery emanating from the heart's left side.

After birth the lungs are activated with the first breath, and blood flowing through the pulmonary artery all goes to the lungs.

By placing tiny flow meters around the pulmonary artery, ductus arteriosus, and aorta in unborn lambs, Dr. Assali was able to chart the change in pressure and resistance to flow, which bring about the new blood flow patterns.

Normally the ductus arteriosus closes shortly after birth. However, in some infants this does not occur, and blood continues to be shunted between the pulmonary artery and aorta before it has a chance to be properly oxygenated in the lungs. This is one of the conditions that causes "blue babies." At this point the surgeon may be called in to close the channel.

There is, however, the possibility that certain drugs could be used to constrict the unwanted duct in "blue babies," thus eliminating the need for surgery. Dr. Assali believes the flow meter techniques may be useful in exploring the use of such drugs.

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NATURAL RESOURCES

Need Modern Techniques To Tap More Ocean Food

➤ MODERN TECHNOLOGY must be projected into the fishing industry to capture efficiently the wealth of ocean food for the hungry people of the world. However, the supply does have a definite limit and must be used wisely by man.

This was the general conclusion reached at the meeting in Washington, D.C., of an international conference on fish in nutrition sponsored by the Food and Agricultural Organization of the United Nations.

"Although man has not yet fully exploited the marine fish resources, it is not so vast as some would have been led to believe," Dr. Robert L. Edwards of the U.S. Bureau of Commercial Fisheries Biological Laboratory, Woods Hole, Mass., said. Many of the most productive fishing areas are probably approaching peak production now.

Dr. Edwards recommended developing totally new fishing gear and practical "harvesting" techniques such as controlling the type of fish species and fertilization to raise the fish "crops."

These new methods are needed because a "great proportion of the world population suffers from a low amount of nutrition," Dr. B. C. Guha of the University College of Science and Technology, Calcutta, India, told the conference. Protein malnutrition, so strongly evident among young children in his country, can be reduced by an increased amount of high-protein fish food from the oceans, he said.

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PSYCHOLOGY

Engineers Urged to Find Tactics for Waging Peace

➤ Engineers meeting in New York were challenged to create organization and tactics for "waging peace" to match the achievement of nuclear bombs and other engines of destruction.

The United States Government, itself, was the creation of the engineering type of mind, Dr. Francis F. Bradshaw of New York, psychological consultant, told the Engineering Management Conference held jointly by three engineering societies, ASME, AIEE and AIIE. Franklin and Washington had the engineer's way of thinking, he said, and Jefferson also was a kind of engineer.

"There are values on both sides of the cold war," he said, "and yet there is no visible, unified, long run, stably led, comprehensive strategy for doing anything else besides provide a military resistance or a military retaliation."

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TECHNOLOGY

Drive-In Banking Now Possible Using TV

➤ WITHOUT LEAVING their automobiles, drive-in customers at the First National Bank in Waukesha, Wis., can see a teller on closed circuit television, talk to him on a high fidelity audio, and exchange cash and banking documents with him through high-speed pneumatic tubes.

Called Autobanker, the system was designed by the Mosler Safe Company and engineered by International Telephone and Telegraph Corporation, New York. The four customer units in the initial installation at Waukesha are in a drive-through building 300 feet from the bank.

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ASTRONOMY

Radiation Polar Caps

A pair of radiation "caps" may be located over the North and South Poles. The theory has yet to be proved by satellite experiments.

▶ A PAIR of radiation polar caps are believed to "hang" over the North and South Poles.

These radiation zones are formed by particles from the sun that circulate around the polar axes. The radiation is believed to be strongest closest to earth and decrease outward, Drs. G. Sprague and C. W. Gartlein of the IGY Auroral Data Center, Cornell University, Ithaca, N.Y., told SCIENCE SERVICE.

The scientists said the radiation caps are similar to the Van Allen radiation belts circulating high above the earth like a big doughnut from about 40 degrees north to 40 degrees south latitude. Both are made up of particles, protons, from the sun deflected by the earth's atmosphere. In the polar regions such particles are responsible for the magnificent displays of northern lights, or auroras.

Drs. Sprague and Gartlein's theory about the aurora is that radiation areas must be present at about 20,000 miles above each pole. The hypothesis still has to be proved from satellite information about the travel of protons to earth and the formation of the radiation area, the scientists said. They believe auroras come down in the region between the Van Allen belts and the polar radiation caps.

The ideal satellite to find out something more about aurora protons should have a polar orbit (circle the earth over the poles) and be able to count particles of low energies. Most of the satellites now going up can only count particles of high energy, they said.

The satellite should also have a "window" of tinfoil, thin enough to let the particles through and thick enough to keep the atmosphere out. This kind of an arrangement is difficult to manage, they said, as the "window" will break very easily.

The two scientists get first hand information about auroras from amateur observers living all over the northern United States. It is important that such observers watch for auroras regularly and send information to the IGY Data Center as some information, for example about the blue light in auroras, can only be gathered by human observers. Much correlated information is necessary about each display.

However, at the present time magnetic storms on the sun, which cause the particles to be flung out in space toward earth, are decreasing and solar activity will be less and less until about 1965.

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CHEMISTRY

New Products Made From Fluorosilicones

▶ DEVELOPMENT of the first commercially marketable line of fluorosilicones, semi-inorganic chemical products that resist heat, cold and oxidation, was reported by Dow Corning Corporation, Midland, Mich.

Fluorosilicones are chemical cousins to the silicones used widely during the past ten years as oils, greases and plastics. The basic difference is that in fluorosilicones, fluoroalkyl groups are substituted for some of the methyl groups in standard silicones. This is said to produce compounds with the additional properties of good solvent resistance and improved lubrication qualities.

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METEOROLOGY

Computer Plots Storms

▶ A COMPUTER has been working overtime these days predicting with fairly good accuracy the paths of hurricanes.

Paths of Hurricanes Carla, Debbie and Esther have been predicted as far in advance as four days with a relatively small percentage of error, Maj. Lloyd W. Vanderman of the U.S. Air Force's Air Weather Service told SCIENCE SERVICE. The weather computer program, still in the experimental stage, may someday replace the present laborious method of predicting hurricane paths by manual computation.

All hurricanes except Alice were tracked this year by the computer. The scoreboard showed good results with Hurricanes Carla, Debbie, and Esther and a fair showing with Hurricane Betsy. The computer pinpointed the Texas coast as the target for Hurricane Carla four days before it hit with devastating fury.

The speedy computor needs only the size of the hurricane's eye, wind speeds at the eye's edge and the hurricane's position to start plotting the probable path. U.S. Weather Bureau meteorologists working with the computer use a "working model" of the large-scale circulation of the atmosphere to guide the computer.

A 96-hour forecast can be obtained from the "model" in 15 minutes, Maj. Vanderman said. The Air Force scientist has been working on the project with the U.S. Weather Bureau for the last three years.

The forecasts are sent twice daily over the hurricane circuit to weather centers. Although the method still has room for improvement, it is possible that a computer in the near future will be telling coastal residents a few days ahead of time to evacuate the lowlands when a hurricane is coming.

Studies conducted on an earlier "working model" showed that the computer was about 120 miles off in a 24-hour forecast. The present model, which is still experimental, the scientist cautioned, is probably at least 25% more accurate.

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AUTOBANKER—The latest in drive-in banking is a closed-circuit television and pneumatic-tube system that allows "long distance" money exchange and conversation between customer and teller.

SCIENTIA INTERNATIONAL

NOVAS DEL MENSE IN INTERLINGUA

Alimentos.—Dr. W. A. Landmann del Fundation del Instituto American de Carne ha isolate le substantias que produce le sapor e aroma de beefsteak. Le substantias de carne esseva dividite in tres portiones: le grassia, le substantias solubile in aqua, e le substantias non solubile in aqua. Le sapor e aroma del carne esseva presente solmente in le portion solubile in aqua. Finalmente duo substantias esseva isolate; acido inosinic e un proteina que contine un saccharo. Iste due substantias in isolation ha nulle aroma, sed quando illos es miscite e calefacite con grassia o aqua le resultato es le indubitabile sapor e aroma de beefsteak.

Archeologia.—Dr. R. Shutler, Jr., del Museo Statal de Nevada has completate un studio, per medio de radiodatation, del migrationes prehistoric del populos del Pacifico. Post le analyse de plus que 100 specimens, Dr. Shutler ha concludite que 4000 annos retro le habitantes del costa del sud de China jam possedeva vascellos capace de navigar le oceano. Ab iste region le ancestres del presente populos pacific sequeva duo routes principal: (1) per le Philippinas ad in Micronesia, e (2) per Indonesia ad in Melanesia. Le specimens indica le presentia del migrantes in le Marianas in le anno 1500 de nostre era, in Samoa in le anno 9 de nostre era, in Hawaii in 124, in Yap in 178, in le Isla de Pascha in 400, e in Nove Zelanda in 1000. Iste chronologia indica le occupation de iste sitos plure seculos ante le datos previemente acceptate.

Astrobiologia.—Le possible existentia del vita organic super le planeta Jupiter es indicate per le resultatos de experimentos conducite per Dr. C. Sagan al Universitate California. In iste experimentos le atmosphera de Jupiter esseva simulate in le laboratorio. Moleculas organic esseva formate quando iste atmosphera esseva subjicite a radiation ultraviolette e discargas electric. Secundo Dr. Sagan temperaturas favorabile pro le vita probabilemente existe al superficie de Jupiter gratias al facto que le radiation solar que entra su atmosphera es convertite in radiation infrarubie que eleva le temperatura del superficie in loco de escappar de novo al spatio.

Cybernetica.—Le Compania Raytheon ha disveloppate pro le solution de problemas un nove machina, le Cybertron, que differe de omne previe computatores electronic in un importante respecto. Durante que le altere computatores executa rapidissimemente un serie de operationes, le quales es precisemente delineate in avante, le Cybertron essaya problemas pro le quales nulle formula es cognoscite. Illo tenta varie solutioes e apprende de su errores. Un Cybertron esseva utilisate successosemente in le construction de un filtro pro separar signales false ab signales significative in equipamento radar.

Metallurgia—Un nove precesso pro le production de alte temepraturas, disveloppate per Dr. B. Karlovitz de Pittsburgh, combina flammas de gas con discargas electric. Le resultante temperatura pote esser duo vices le temperatura del flamma sol. Le discarge electric es conducite intra le fornace per le flammas. Alte voltages non es requirite, e le electrodos non es exponite a alte temperaturas. Le processo permitte le fusion de omne substantias cognoscite, incluse materiales si refractari como quarz e tantalium. Illo debe trovar multe applicationes in le metallurgia e in le technologia industrial.

Inventiones.—Le 3.000.000me patente del Statos Unite esseva accordate le 12 de septembre 1961 a Dr. K. R. Eldredge del Instituto de Recercas Stanford in California. Le invention de Dr. Eldredge es un rapide systema electronic pro leger cheques bancari.

Oceanographia.—Dr. R. M. Pratt del Institution Oceanographic Woods Hole reporta que pecias de rocca glacial ha essite dragate ab le oceano proxime al Canarias e al costa de Africa. Le roccas probabilemente esseva portate per icebergs ab Nove Anglaterra a lor presente location.

Physica Atomic.—Dr. B. C. Maglic de Yugoslavia e Drs. L. W. Alvarez, A. H. Rosenfeld, e M. L. Stevenson del Universitate California reporta le discoperta del omega, un nove particula elementari. Le omega ha un massa equivalente a 1540 electrones e, como le neutron, ha nulle carga electric. Illo es create al collision e annihilation mutual de un proton e un antiproton. Le duration de su vita es solmente 10^{-20} secundas. A causa de iste extreme brevitate le omega non esseva observate directemente, sed su existentia poteva esser deducite ab le observation de gruppos de tres piones (mesones pi), le quales es producite per le disintegration de omne omega. Le numero de particulas elementari que ha essite discoperite nunc excede 30. Le accumulation de datos in re le omega e altere particulas debe contribuer al formulation—in le futuro non troppo distante—de un satisfacente theoria general del particulas elementari que compone omne materia.

Physiologia.—Dr. F. A. Brown, Jr., reporta in *Nature* que le cambaro cec de Mammoth Cave in Kentucky, que ha essite isolate ab le lumine del die durante innumerabile generationes, e que vive in aqua de temperatura plus o minus constante, nonobstante exhibi un regular cyclo diurne de metabolismo con un maximo de activitate metabolic a circa 7 p.m. e un minimo a circa 9 a.m. Multe altere organismos exhibi un simile cyclo.

Recercas de Cancere.—Drs. G. T. Okita e E. A. Ezz del Universitate Chicago reporta que in experimentos con muses esseva constatate un marcate differentia inter individuos cancerose e individuos normal in lor consumption de oxygeno. Le consumption de oxygeno in le oxydation de alimentos per le animales esseva mesurate per medio de injectiones de alimentos radioactive in le muses e le subsequente mesuration del radioactive bioxydo de carbon exhalate per illos. Le consumption de oxygeno esseva multo plus alte in le individuos noncancerose.

Recercas de Cancere.—Drs. J. Gershon-Cohen, M. B. Hermel, e S. M. Berger de Philadelphia reporta que 23 casos de cancere mammari esseva discoperite in un studio radiologic de 1.312 feminas qui esseva libere de symptomas de cancere. In le studio roentgenogrammas esseva prendite a intervallos de 6 menses durante un periodo de 5 annos. In 70 pro cento del canceres discoperite metastase non habeva occurrite.

Taxonomia.—Dr. T. L. Jahn del Universitate California predice le utilisation de computatores electronic pro le solution de problemas del classification scientific de animales e plantas. Isto requirerea le elaboration de un codice numeric pro indicar le tractos le plus significative de organismos. Dr. Jahn signala que in omne organismos le acido disoxyribonucleic del chromosomas contine un codice complexissime per medio del qual le integre hereditage genetic del organismo es transmittite. Studios de iste codice genetic debe esser de grande valor al taxonomia, sin reguardo a su possibile adaptabilitate al computation electronic.

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GENERAL SCIENCE

Reading Interlingua

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SPACE

Space Age: Four Years Old

The Space Age began with the first Sputnik. Since then the U.S. has successfully launched three times as many satellites as the USSR, Tove Neville reports.

▶ THE SPACE AGE is four years old this October.

The USSR has chalked up the most spectacular space scores: big boosters, heavy payloads and the first man to orbit the earth.

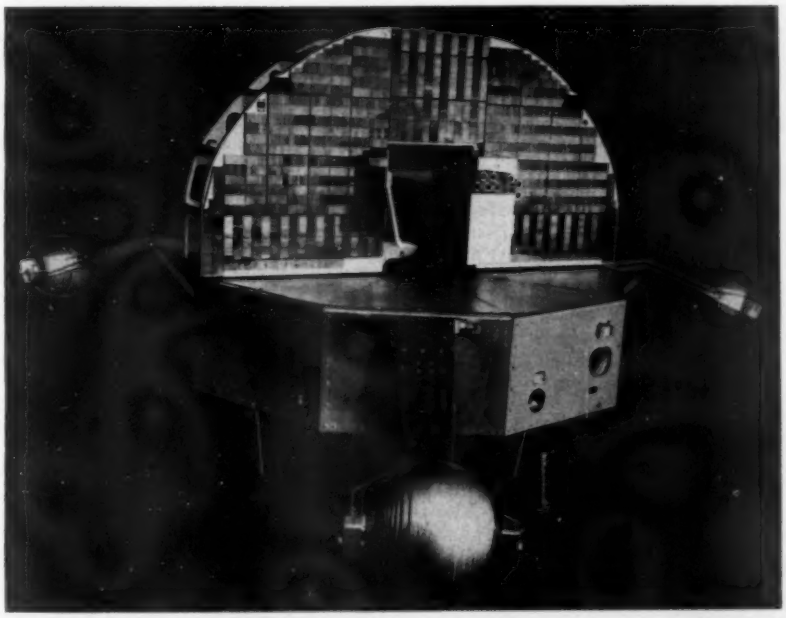
Nevertheless, the U.S. is far ahead where it really counts: in solid scientific achievements from satellite and space probe information.

As of mid-September, the U.S. has launched 54 satellites and space probes, the USSR has launched 16.

Of these, 52 U.S. satellites went into earth orbit. Russia had 13 earth satellites. The U.S. and USSR both have two probes in solar orbit. The USSR has sent one rocket to the moon. One of the 13 Russian earth satellites was Lunik III, which passed once around the moon and then went into earth orbit. Two U.S. space probes, Pioneer I and III, which did not reach the vicinity of the moon, collected important scientific information.

At the present time, the U.S. has 30 satellites in earth orbit, Russia only one. Of the U.S. satellites, 12 are still transmitting scientific information back to earth. None of the USSR satellites are transmitting.

The great scientific program instituted and accomplished by the U.S. in four short years speaks for itself in the calendar of satellites below.



SOLAR EYE—The Orbiting Solar Observatory is now going through the final test phases. It will measure the ultraviolet rays that can be detected only in space.

Calendar of Satellites

This is the complete list of space satellites and probes successfully launched by the U.S. and USSR from the beginning of the space age, Oct. 4, 1957.

The orbital distances when closest to and farthest from earth (moon or sun) are shown in miles. The latest available figures from the National Aeronautics and Space Administration are used for objects still in orbit. Orbital distances of satellites no longer up are the original NASA figures calculated while object was still in orbit. The time it takes a satellite to travel around the earth (moon or sun) is shown in minutes or days. Objects still in the sky are marked with an asterisk. Those still transmitting have two asterisks.

SPUTNIK I (USSR) Oct. 4, 1957-Jan. 4, 1958. Measured atmospheric density, temperatures. 142-558 miles. 96.2 minutes.

SPUTNIK II (USSR) Nov. 3, 1957-April 14, 1958. Biomedical experiments, measured solar influence on upper atmosphere densities, cosmic rays. 140-1,038 miles. 103.7 minutes.

*EXPLORER I (U.S.) Jan. 31, 1958 to 1961-1963. Discovered Van Allen radiation belt (believed most significant find of the International Geophysical Year). 217-1,100 miles. 106.2 minutes.

**VANGUARD I (U.S.) March 17, 1958-2158. Found earth is pear-shaped, tested vehicle and satellite. 404-2,451 miles. 133.9 minutes.

EXPLORER III (U.S.) March 26, 1958-June 27, 1958. Data on radiation belts, micrometeor impacts, temperatures. 117-1,741 miles. 114.7 minutes.

SPUTNIK III (USSR) May 15, 1958-April 6, 1960. For studying atmospheric pressure, composition; concentration of ions; magnetic fields; cosmic rays. 135-1,167 miles. 106 minutes.

EXPLORER IV (U.S.) July 26, 1958-Oct. 23, 1959. Data of radiation belts, spatial relationships, analyzed earth's magnetic field. 157-1,388 miles. 110.1 minutes.

PIONEER I (U.S.) Oct. 11, 1958-Oct. 12, 1958. Determined radiation band, first observation of hydromagnetic oscillations of earth's magnetic field. Space probe.

PIONEER III (U.S.) Dec. 6, 1958-Dec. 7, 1958. Discovered second radiation belt around the earth. Space probe.

PROJECT SCORE (U.S.) Dec. 18, 1958-Jan. 21, 1959. First time human voice beamed from space, relayed messages from U.S. ground stations. 110-920 miles. 101.46 minutes.

*LUNIK I (USSR) Jan. 2, 1959-indefinite. To study interplanetary matter, solar radiation, magnetic fields of earth and moon. Solar orbit: 90.8-122.5 million miles from sun. 450 days.

*VANGUARD II (U.S.) Feb. 17, 1959-1969. For studying cloud cover. 344-2,052 miles. 125.4 minutes.

DISCOVERER I (U.S.) Feb. 28, 1959 to early March, 1959. Tested Discoverer-Thor combination in polar orbit. 176-519 miles. 95.57 minutes.

*PIONEER IV (U.S.) March 3, 1959 in continuing solar orbit. Important data on solar radiation, tested long-range tracking. 91.8-106.2 million miles from sun. 398 days.

DISCOVERER II (U.S.) April 13, 1959-April 26, 1959. For studying propulsion, communication, recovery techniques, cosmic radiation. 156-225 miles. 90.4 minutes.

*EXPLORER VI (U.S.) Aug. 7, 1959-1961. Televised first pictures of earth's cloud cover, detected electrical ring current, mapped Van Allen belt and earth's magnetic field. Position uncertain.

DISCOVERER V (U.S.) Aug. 13, 1959-Feb. 11, 1961 (capsule); Sept. 28, 1959 (satellite). For same purposes as Discoverer II. 120-718 miles. 98.3 minutes.

DISCOVERER VI (U.S.) Aug. 19, 1959-Oct. 20, 1959. For same purposes as Discoverer II. 139-537 miles. 95.3 minutes.

LUNIK II (USSR) Sept. 12, 1959-Sept. 13, 1959. Hit the moon, studied magnetic fields of earth and moon, particles in space, cosmic rays.

*VANGUARD III (U.S.) Sept. 18, 1959 to 1989-1999. Surveyed earth's magnetic field, located edge of Van Allen belt, accurate count of micrometeorite impacts. 317-2,320 miles. 129.8 minutes.

LUNIK III (USSR Oct. 4, 1959 to mid-April, 1960. Photographed moon's far side. Circled moon and earth. 24,840-292,000 miles. 15 days.

**EXPLORER VII (U.S.) Oct. 13, 1959 to 1979-1989. Data on radiation and magnetic storms, first micrometeorite penetration of sensor in flight, detected weather patterns. 344-669 miles. 101.1 minutes.

DISCOVERER VII (U.S.) Nov. 7, 1959-Nov. 26, 1959. For same purposes as Discoverer II. 104-550 miles. 95 minutes.

DISCOVERER VIII (U.S.) Nov. 20, 1959-March 7, 1960. For same purposes as Discoverer II. 120-1,000 miles. 103 minutes.

*PIONEER V (U.S.) March 11, 1960 for 100,000 years. Set long-range communications record (22,500,000 miles), data on solar flare effects, particles and magnetic fields. Solar orbit: 74.9-92.5 million miles from sun. 311.6 days.

**TIROS I (U.S.) April 1, 1960 to 2010-2060. Took more than 22,000 pictures of cloud covers relayed by TV, data for meteorological satellite system. 429-467 miles. 99.1 minutes.

*TRANSIT I-B (U.S.) April 13, 1960-1961. Data for global navigational satellite system. 229-412 miles. 94.9 minutes.

DISCOVERER XI (U.S.) April 15, 1960-April 26, 1960. For same purposes as Discoverer II. 109-380 miles. 92.25 minutes.

*SPUTNIK IV (USSR) May 15, 1960 for brief time. Tested life support systems for manned space flight. 175-305 miles. 92.3 minutes.

*MIDAS II (U.S.) May 24, 1960-1963. Tested infrared scanner system for detection of missile launchings. 297-314 miles. 94.3 minutes.

**TRANSIT II-A—GREB (U.S.) June 22, 1960-2010. Two satellites fired at once, data for navigational satellite system. Transit II-A 389-649 miles. 101.6 minutes. Greb 381-657 miles. 101.6 minutes.

DISCOVERER XIII (U.S.) Aug. 10, 1960-Aug. 11, 1960 (capsule); Nov. 14, 1960 (satellite). Data on propulsion, communication, orbital performance, recovery technique; capsule recovered from sea. 161-436 miles. 94.1 minutes.

*ECHO I (U.S.) Aug. 12, 1960-indefinite. First passive communications satellite, voice and telephone transmission. 823-1,095 miles. 116.9 minutes.

DISCOVERER XIV (U.S.) Aug. 18, 1960-Aug. 19, 1960 (capsule); Sept. 16, 1960 (satellite). Same as Discoverer XIII, capsule recovered in mid-air. 116-502 miles. 94.5 minutes.

SPUTNIK V (USSR) Aug. 19, 1960-Aug. 20, 1960. Tested systems for manned space flight, capsule recovered in 18th orbit. 190-211 miles. 90.72 minutes.

DISCOVERER XV (U.S.) Sept. 13, 1960-Sept. 15, 1960 (capsule); Oct. 18, 1960 (satellite). For same purposes as Discoverer XIII. 130-472 miles. 94.24 minutes.

**COURIER I-B (U.S.) Oct. 4, 1960 for several years. Data for military communications system. 611-743 miles. 106.8 minutes.

*EXPLORER VIII (U.S.) Nov. 3, 1960-1970. Data on ionosphere composition, micrometeorites. 262-1,409 miles. 112.5 minutes.

DISCOVERER XVII (U.S.) Nov. 12, 1960-Nov. 14, 1960 (capsule); Dec. 29, 1960 (satellite). Same as Discoverer XIII, capsule recovered in mid-air. 116-616 miles. 96.45 minutes.

**TIROS II (U.S.) Nov. 23, 1960 to 2010-2060. Data for meteorological satellite system. TV pictures of clouds. 378-461 miles. 98.2 minutes.

SPUTNIK VI (USSR) Dec. 1, 1960-Dec. 2, 1960. Tested equipment for manned space flight. 112-155 miles. 88.6 minutes.

DISCOVERER XVIII (U.S.) Dec. 7, 1960-Dec. 10, 1960 (capsule); April 2, 1961 (satellite). Same as Discoverer XIII, capsule recovered in mid-air after 48 orbits. 154-459 miles. 94.1 minutes.

DISCOVERER XIX (U.S.) Dec. 20, 1960-Jan. 23, 1961. Studied atmospheric phenomena and infrared radiation. 128-323 miles. 92 minutes.

*SAMOS II (U.S.) Jan. 31, 1961 for undisclosed time. Observed space, earth and its atmosphere. 295-341 miles. 94.9 minutes.

SPUTNIK VII (USSR) Feb. 4, 1961-Feb. 26, 1961. Tested heavy satellite in orbit (7.1 tons). 138.75-203.56 miles. 89.8 minutes.

*SPUTNIK VIII—VENUS PROBE (USSR) Feb. 12, 1961-Feb. 25, 1961 (Sputnik). Venus probe for indefinite time that was launched from satellite toward Venus for long-range communication, observation of space. Solar orbit: 66.8-94.7 million miles from sun. 300 days.

*EXPLORER IX (U.S.) Feb. 16, 1961-1962. Tested Scout vehicle, sent balloon into orbit for atmospheric studies. 431-1,562 miles. 118.1 minutes.

*DISCOVERER XX (U.S.) Feb. 17, 1961 to late 1961. Evaluated stabilization system. 176-413 miles. 94.1 minutes.

*DISCOVERER XXI (U.S.) Feb. 18, 1961 for undisclosed time. For engineering, atmospheric and infrared radiation studies. Agena engine restarted in space for the first time. 154-516 miles. 95.5 minutes.

TRANSIT III-B—LOFTI (U.S.) Feb. 21, 1961-March 30, 1961. Two unseparated satellites gathering data for navigational satellite system, geodetic measurements, and radio transmission. 117-511 miles. 94.5 minutes.

SPUTNIK IX (USSR) March 9, 1961-March 9, 1961. Tested system for manned space flight, recovered cabin with live animals. 115-155 miles.

*EXPLORER X (U.S.) March 25, 1961 for uncertain time. Data on interplanetary magnetic fields. Original orbit: 100-145,000 miles.

SPUTNIK X (USSR) March 25, 1961-March 25, 1961. Same as Sputnik IX, recovered live animals at predetermined site. 111-150 miles. 88.4 minutes.

*DISCOVERER XXIII (U.S.) April 8, 1961 for undisclosed time. Testing guidance, and control of orbit. 183-341 miles. 93.1 minutes.

VOSTOK I (USSR) April 12, 1961-April 12, 1961. Manned space ship recovered after one orbit, tested man's reactions in space. 108.76-187.66 miles. 89.1 minutes.

**EXPLORER XI (U.S.) April 27, 1961 to 1962-1964. Orbited a special telescope for mapping gamma rays from cosmic sources. 302-1,113 miles. 107.9 minutes.

DISCOVERER XXV (U.S.) June 16, 1961-June 18, 1961 (capsule); July 12, 1961 (satellite). Tested improvements of orbital period controls, capsule recovered from sea after 33 orbits. 139.1-251.6 miles. 90.87 minutes.

**TRANSIT IV-A—GREB III and INJUN (U.S.) June 29, 1961-1962 (Transit); indefinite (Greb and Injun). Three satellites, two not separated; data for navigational satellite system, on solar X-rays and on cosmic rays. Transit 547-620 miles. Greb and Injun 548-619 miles. 103.8 minutes.

*DISCOVERER XXVI (U.S.) July 7, 1961-July 9, 1961 (capsule); 1962 (satellite). Same as Discoverer XXV, capsule recovered in mid-air after 32 orbits. 142-410 miles. 93.5 minutes.

**TIROS III (U.S.) July 12, 1961-1961. Data for meteorological satellite system, TV pictures of clouds. 457-510 miles. 100.3 minutes.

*MIDAS III (U.S.) July 12, 1961 for indefinite time. Tested system for detection of missile launchings. 2,084-2,197 miles. 161.5 minutes.

VOSTOK II (USSR) Aug. 6, 1961-Aug. 7, 1961. Manned spaceship, studied effects on man of long orbital flight, recovered in 18th orbit. 110.3-115.3 miles. 88.6 minutes.

**EXPLORER XII (U.S.) Aug. 15, 1961-1962. Data on solar wind, interplanetary magnetic fields, particles in space, Van Allen belts. 165-47,858 miles. 26 hours and 24 minutes.

RANGER I (U.S.) Aug. 23, 1961-Aug. 30, 1961. Tested systems for lunar probes, particles in space. 105.3-312.5 miles. 91.1 minutes.

EXPLORER XIII (U.S.) Aug. 25, 1961-Aug. 28, 1961. Tested Scout vehicle, studied micrometeorites. 174.60-606.34 miles. 97.27 minutes.

DISCOVERER XXIX (U.S.) Aug. 30, 1961-Sept. 1, 1961 (capsule); Sept. 10, 1961 (satellite). Same as Discoverer XXV, carried biological experiments, capsule recovered from sea on 33rd orbit. 140-345 miles. 91 minutes.

**DISCOVERER XXX (U.S.) Sept. 12, 1961-Sept. 14, 1961 (capsule); unknown time (satellite). Same as Discoverer XXV, carried biological experiments, capsule recovered in mid-air. 154-345 miles. 92.4 minutes.

MERCURY-ATLAS IV (U.S.) Sept. 13, 1961-Sept. 13, 1961. Tested systems and tracking network for manned space flight, capsule recovered after one orbit. 100-158 miles. 89 minutes.

**DISCOVERER XXXI (U.S.) Sept. 17, 1961—for unknown time. For measuring radiation, Discoverer performance and reliability. 152-255 miles. 91 minutes.

• Science News Letter, 80: 221 September 30, 1961

SPACE

Mercury Capsule Orbited Two Satellites Launched

▶ THE FIRST Mercury capsule has been orbited around the earth and successfully recovered. On Sept. 13, the capsule carrying an astromech, or mechanical man, made the trip in 89 minutes and then descended into the Atlantic Ocean east of Bermuda, the National Aeronautics and Space Administration reported. The next step in the manned space flight program is expected to be an orbital trip of the capsule carrying a chimpanzee.

Two Discoverer satellites, XXX and XXXI, have been launched. On Sept. 12, Discoverer XXX went up to test orbital period controls. It also carried biological experiments for studies of radiation effects on living matter. The capsule was recovered Sept. 14 in the Pacific Ocean north of Hawaii. The satellite is still orbiting.

Discoverer XXXI was launched Sept. 17 to measure radiation and Discoverer performance and reliability. However, the goldplated capsule failed to separate from the satellite and no recovery of the capsule is expected. The Air Force satellite Discoverer XXXI was the 21st of its series to orbit successfully.

On Sept. 13 an experiment to measure atmospheric winds, temperatures and density high in the earth's atmosphere was launched by NASA from the launching site at Wallops Island, Va.

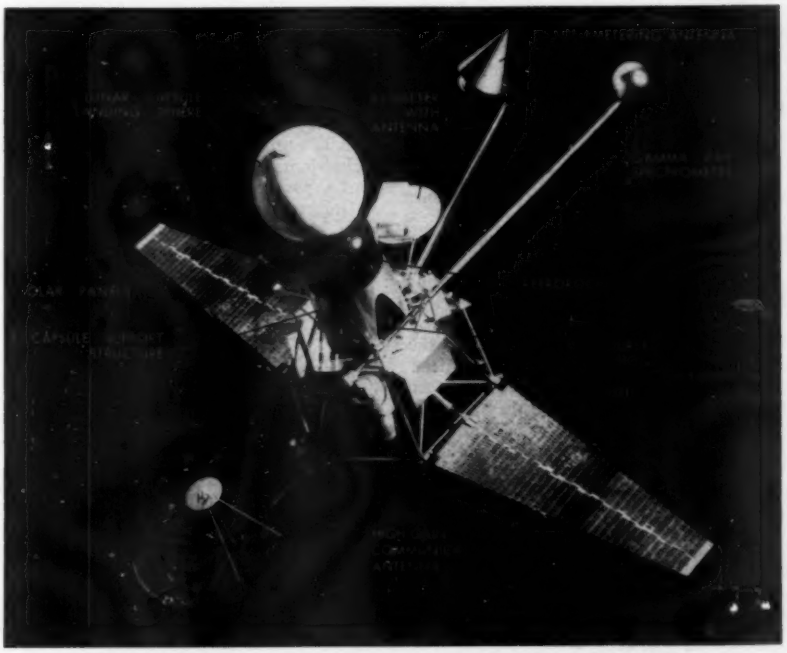
A four-stage sounding rocket sent forth a sodium vapor cloud at two altitudes, 120 and 228 miles up. Trails of bright orange clouds at both altitudes were visible for hundreds of miles.

• Science News Letter, 80:223 September 30, 1961

SPACE

"Talking Ball" to Land, Investigate Moon in 1962

▶ A "TALKING BALL" covered with balsa wood is scheduled to land on the moon in 1962.



MOON BALL ON TOP OF RANGER SPACECRAFT

The ball will contain a seismometer to record moon quakes, and temperature devices and instruments for sending information back to earth about conditions on the moon.

It will travel to the moon on top of the Ranger spacecraft, now under development at Jet Propulsion Laboratory, Pasadena, Calif. After the 240,000-mile trip, the "moon ball" will be detached from the Ranger and hit the moon at less than 150 miles an hour. A retro-rocket will slow it down to this speed.

The separation of the moon ball, made by the Ford Motor Company's Aeronutronic Division, Newport Beach, Calif., will take place 20 to 25 miles above the lunar surface. The Ranger vehicle will continue its flight at 5,000 miles an hour until it crashes into the moon.

Inside the 25-inch sphere a "survival sphere" holding the instruments floats in a liquid, an arrangement planned to ease the impact of the landing after the 60- to 70-hour flight.

The Ranger vehicle will be boosted into space by the Atlas-Agena B rocket. The moon ball will be "hospital clean" before launch to eliminate any earth germs that might contaminate the moon and destroy evidence or clues to the way the solar system was originally formed. Internal instruments in the sphere will be biologically sealed to further insure sterlization.

• Science News Letter, 80:223 September 30, 1961

MILITARY SCIENCE

Gas, Germs, May Decide Result of Nuclear War

➤ GAS AND GERM weapons, used in conjunction with nuclear weapons, could make the difference in determining who survives an all-out nuclear war, the U.S. Army's chief chemical officer, Maj. Gen. Marshall Stubbs, believes.

An enemy able to use chemical and biological warfare along with nuclear strikes is more apt to assume he can win a nuclear war, especially if the United States is unable to retaliate in kind, Gen. Stubbs told the Armed Forces Chemical Association in Washington, D.C.

Urging a U.S. build-up of a "balanced arsenal" that includes such weapons, he said we must use "every reasonable weapons system" to be prepared for any form of warfare.

"Chemical and biological agents exist which can be used strategically to cause casualties in an area the width of a continent," he pointed out. "Shelters which would protect the population from nuclear blast will not necessarily protect it from chemical or biological attack."

Gas and germs can be used flexibly in a measured and restrained response to varied military situations, he said. They can be used to pinpoint targets without "spill-over effects." They can be used to put aggressors out of action temporarily, or to kill "a large percentage of the target population."

They are effective search weapons against troops in the open or under cover. Results can be preset as immediate or delayed for a given time. Means of delivery range from intercontinental ballistic missiles to tiny insect carriers for some biological agents.

Gen. Stubbs said that in the Korean conflict, chemical mine fields, if they had been used instead of improvised flame mine fields, could probably have stopped any mass attack on foot. The flames that were used stopped only the first wave of attackers.

• Science News Letter, 80:224 September 30, 1961

TECHNOLOGY

Windmill Power Needed In Developing Areas

➤ SMALL, cheap, simple wind machines, preferably made from local materials, are needed to supply electricity in many of the world's developing countries, Edward W. Golding of the Electrical Research Association, London, told the United Nations Conference on New Sources of Energy in Rome.

A current stalemate in windpowered unit production was reported by Dr. Ulrich Hutter of the Polytechnic Institute, Stuttgart, German Federal Republic. He said industrialized countries are waiting for a bigger demand, while developing countries are waiting for production to start before they make plans to buy and use the machines.

Prof. Paul P. Santorini of the National Technical University of Greece said about 10,000 small, primitive windmills are used continuously to pump water in his country.

India plans to install 200 windmills in rural areas, and expects the benefits from electric power to more than justify the cost, said Prof. M. S. Thacker, director-general of India's Council of Scientific and Industrial Research.

In the United States, some 500,000 windmills used during the 1920's are now obsolete because many farms now need more power than windplants can supply, Dr. William B. Hillig, Schenectady, N.Y., solar energy consultant, reported.

• Science News Letter, 80:224 September 30, 1961

GENERAL SCIENCE

Science Confuses Public; Education Efforts Urged

➤ AMERICAN universities should take the lead in promoting two needed programs for public education in science, according to A. Hunter Dupree, history professor at the University of California, Berkeley.

The first should be aimed at "an audience that does not know what a scientist does or how he thinks or solves a problem."

The second would be for persons "already in touch with science and challenged by that very fact to understand it as a social activity"—growing army of science-affected technicians, administrators, military men and philosophers.

Universities lack the manpower to conduct the programs, but can decide on indirect methods using education techniques developed elsewhere. They will pay a high price if they do nothing, Prof. Dupree said. "Misunderstanding science and its role in civilization levies a toll on all mankind."

The public, he reports in Science, 134: 716, 1961, tends to confuse the end-product marvels of technology with actual scientific work. Not understanding science, they worship it as a messiah "while fearing its diabolical power."

He believes three major factors destroyed the 19th century faith, exemplified by public lectures and workmen's institutes on scientific topics, that science could be taught to the public.

First, specialization made science so complex that is was "far beyond the comprehension of any one mind, professional or lay."

Second, science became linked with technology and "lost its place as a part of genteel culture." Over-emphasis on technological products gave many citizens the unfortunate impression that Henry Ford stands high among the ranks of American scientists.

Third, there were no longer enough qualified scientists to "man all the posts in society which require an understanding of science." In World War II, for example, radar technology had to be taught to thousands who previously knew nothing about electronics.

These trends have kept the common man from understanding high-level science, at the same time involving more common men directly in scientific affairs, Prof. Dupree says.

• Science News Letter, 80:224 September 30, 1961

IN SCIEN

MEDICINE

Mystery Bone Disease Puzzles Physicians

➤ A 65-YEAR-OLD woman is cheerfully driving a car and continuing other activities with a left arm affected by a rare "bone-disappearing disease" that has remained a mystery to the medical profession for more than 100 years.

Except for legal requirements of the Drivers License Bureau, however, her physicians say she would discard the splint attachment that is fitted to her arm.

Drs. Joe M. Abell Jr. and Carl E. Badgley of the University of Michigan Medical Center, Ann Arbor, report in the Journal of the American Medical Association, 177: 771, 1961, that this case is similar to one in 1838 in which a young man with a virtually boneless arm could lift 100 pounds.

Only about 33 cases of this ailment, properly known as Gorham's Disease, have been reported in this country. It affects young people mainly, but the young man described in 1838 lived to die of pneumonia at the age of 70. All attempts to alter the course of the disease have failed.

Treatment has included vitamin D, parathyroid hormone, androgens (male hormones), calcium, adrenal extracts, vitamin B-12, amino acids, placental extracts and transfusions of placental blood. Radiation treatment has been recommended but has not proved to be of value.

• Science News Letter, 80:224 September 30, 1961

OCEANOGRAPHY

Gulf Stream Extension Seen in Plankton Find

➤ THE FINDING of warm-water species of plankton in the North Atlantic Ocean, northeast of the Newfoundland Grand Banks, has led to speculation that a "temporary extension" of the Gulf Stream current system may have brought them there.

V. Bainbridge of the Oceanographic Laboratory, Edinburgh, reports in Nature, 191:1216, 1961, that patches of warm-water zooplankton, minute oceanic animal life, were present in samplings taken in February, 1960, and March, 1961, at times when the area's surface temperatures were near their lowest.

The region is the meeting place of the cold water of the Labrador current from the north and the warmer waters of the North Atlantic current from the south. The theory is that the warm Gulf Stream current, flowing from the Gulf of Mexico along the United States coast to Nantucket Island, Massachusetts, and from there eastward, may be entering the area northeast of the Grand Banks at intervals not yet determined. Further plankton samplings and study are needed, Mr. Bainbridge said.

• Science News Letter, 80:224 September 30, 1961

NE FIELDS

ZOOLOGY

Privacy of Burrowing Animals Threatened

➤ TO KEEP TRACK of the underground activities of small burrowing animals, California scientists have developed an instrument that "tunes in" on them. The changing of the tune depicts the various movements.

Drs. J. Lee Kavanau and Kenneth S. Norris, zoologists at the University of California, Los Angeles, have devised a sand-filled compartment strung with copper wires. The wires, connected to a radio-frequency oscillator, "sing" a constant tune.

Movements of animals such as snakes and lizards through the box can then be traced by noting the change in tune created when they burrow near the sensitive wires. Preliminary experiments on snakes and lizards showed variable periods of activity separated by rests as long as 45 hours.

One small snake often rested near the sand's surface with only an inch of tail showing. The tail was probably used to test the outside temperature, the scientists report in Science, 134:730, 1961.

• Science News Letter, 80:225 September 30, 1961

MEDICINE

Highlights of Health and Medical News

➤ SKIN DISORDERS are estimated to make up from 10% to 15% of a doctor's everyday practice, the Journal of the American Medical Association, 177:778, 1961, reports as it begins a monthly section on cutaneous medicine.

The black widow spider is not the only one that can produce serious injury, four Dallas, Texas, physicians report in the American Journal of Diseases of Children, 102:395, 1961. Unidentified spiders are suspected of causing convulsions and other severe reactions in an eight-year-old boy and a six-year-old girl playing in a barn where there was a brown hairy spider, the *Loxosceles reclusus,* commonly found in Missouri and nearby states, including Texas.

Heart disease has become a leading cause of death in Puerto Rico according to a report by four San Juan doctors in the Archives of Pathology, 72:367, 1961. After age four, the aortas of 300 autopsied Puerto Ricans between two and 40 years of age showed fatty streaks, regardless of the cause of death.

Depression-prone persons are slower than more cheerful patients to recover from influenza. At Fort Detrick, Frederick, Md., as reported in the Archives of Internal Medicine, 108:393, 1961, 600 employees, mostly men, were given psychological tests, just before an outbreak of Asian flu. The investigators, who were all from Johns Hopkins University Hospital, Baltimore, said the depressed state of patients previous to the illness determined the slowness with which they recovered.

The responsibility of the lay press in giving misleading medical information to the public is stressed in the leading editorial of the Canadian Medical Association Journal, 85:658, 1961. Reference is made to an article in Maclean's magazine of Aug. 26 entitled "Three Blood Transfusions Out of Four Are More Likely to Harm Than to Heal," which was condemned as unscientific.

Substituting office and hospital calls for home calls allows the present-day physician to see twice as many patients in a week as he did in 1930, according to the American Medical Association, 177:793, 1961.

• Science News Letter, 80:225 September 30, 1961

METEOROLOGY

Atomic Bombs Wrongly Blamed for Hurricanes

➤ PEOPLE are again blaming the weather, in this case, hurricanes, on atomic testing. People in the know are saying it is the bothersome meandering of upper atmosphere winds.

Jerome Namias, head of the U. S. Weather Bureau's extended forecast section, said that hurricanes are strongly influenced by the planetary winds, a globe-circling band blowing high in the atmosphere. The shifting of these winds has been responsible for much of the weather conditions that led the hurricanes to the U. S. coast.

A "dramatic change" developed at the end of August and early September when the westerly winds began meandering in wide loops. Easterly winds began picking up in the tropics, and a high pressure system also developed. The expected increased warming of the oceans from the summer sun then set the stage for the prevailing weather conditions that spawned hurricanes Carla, Debbie, and Esther.

"The reason for the dramatic change is not too clear," Mr. Namias said. He believes that the area where tropical storms are born is largely determined by the world-wide air flow patterns. Meandering planetary winds form ridges and troughs that act as passageways for the hurricanes. The wave patterns or loops help or hinder storm development, depending on their position.

The warning that the winds were set to meander came in the East during late August when the generally cool weather was replaced by a heat wave. Colorado residents noted the abrupt change by an unusual snowfall.

The reversal in weather happened when the ridges and troughs of the winds switched places over the Rocky Mountains and the eastern seaboard. Prior to the change, conditions were not conductive to forming tropical storms due to the presence of cooler air much farther south than usual, Mr. Namias emphasized.

The change in the weather pattern began before the Russians resumed nuclear testing, Mr. Namias pointed out.

• Science News Letter, 80:225 September 30, 1961

GENERAL SCIENCE

Searches for Science Talented in High Schools

➤ HUNDREDS of high school seniors who are outstandingly talented in science have been selected to receive honors and college scholarships by State Science Talent Searches in 39 states and the District of Columbia.

Sponsored by state academies of science, universities and colleges, museums and scholarship foundations, the state searches are conducted by special arrangement with Science Clubs of America and SCIENCE SERVICE and are held in conjunction with the national Science Talent Search for the Westinghouse Science Scholarships and Awards.

A Science Clubs of America summary of State Science Talent Search activities for 1960-61 is now available. A total of 504 students were selected for state honors and thousands of dollars in scholarships. Additional scholarships were awarded by colleges and universities on the basis of the recommendations of the State Science Talent Search committees.

Winning students were given awards of books, subscriptions to scientific journals, scholarships and opportunities to attend scientific meetings, tour laboratories and confer with professional scientists. The awards were made at banquets, special meetings of state academies of science, programs on university campuses and at state science fairs.

Many state directors reported plans for expanded programs and awards for the 1962 state searches.

Celebrating its 21st anniversary this year, the annual Science Talent Search for the Westinghouse Science Scholarships and Awards is conducted by Science Clubs of America, an activity of SCIENCE SERVICE, and is supported by the Westinghouse Educational Foundation.

• Science News Letter, 80:225 September 30, 1961

BIOCHEMISTRY

Finds Formation Steps For Primitive Chemical

➤ THE STEPS by which the chemical, adenine, could have been formed on the primitive earth have been found.

Dr. J. Oro of the University of Houston, Houston, Texas, reports in Nature, 191:1193, 1961, that he had produced adenine from hydrogen cyanide, ammonia and water by a complex process of six reactions.

Adenine, an amino acid basic to life on earth, is necessary for the structure and function of genes, for energy metabolism and for many other biochemical functions. Adenine is believed to play an important part in the transfer of genetic information.

Hydrogen cyanide, ammonia and water are believed by many scientists to have been present on earth at its early stages and over millions of years to have combined into the kind of organization required for the origin of life.

• Science News Letter, 80:225 September 30, 1961

GENERAL SCIENCE

Space Age World's Fair

Seattle readies a giant international exposition showing the shape of things to come. Biggest single exhibit is the Federal Science Pavilion, David Meier reports.

➤ FOR VISITORS to next year's Century 21 exposition in Seattle, Wash., dinner at the top of the tallest building west of the Mississippi River promises to be a moving experience, in more ways than one.

While they eat, their "revolving restaurant" will be neatly executing a full 360-degree turn against a natural scenic backdrop of mountains and lakes, seen from 600 feet up.

This unique establishment will crown the exposition's official symbol—a $3,000,000 steel-and-glass "Space Needle," dominating the 74-acre Century 21 site.

Century 21, the nation's first world's fair since 1939, is an $80,000,000 "spectacular" slated to run from April 21 to Oct. 21, 1962. The theme is "Man in the Space Age." Ten million visitors are expected.

The Space Needle is only one among many promised wonders that include a Government-sponsored U. S. Science Pavilion, an international art exhibit, commercial and industrial exhibits from at least 35 nations, and the world's first commercial monorail system.

The Space Needle, now under construction, is supported by three pairs of rigid steel legs, anchored 30 feet underground, and a central utility shaft. Visitors can reach the restaurant and the observation deck above it by two high-speed elevators or by a pair of winding, interlacing staircases, each with 832 steps. The restaurant, seating 220, will make one complete revolution each hour.

For Federal participation in Century 21, Congress authorized a $9,000,000 expenditure, making Uncle Sam himself the largest exhibitor. The Science Pavilion is described as "the greatest science exhibit ever assembled for public showing," larger in size and scope than the U. S. Pavilion at the Brussels World's Fair in 1958.

The exhibit is being planned by the Department of Commerce, in cooperation with the National Science Planning Board and many leading scientists. Dr. Athelstan F. Spilhaus, dean of the University of Minnesota's Institute of Technology, is in charge.

Dr. Spilhaus does not want a science exhibit that can be understood only by scientists.

"Science is one of the highest forms of entertainment," he said. "We plan to entertain the adults and children with the exhibit, and should they happen to become educated by it, that's fine, but education is not the intent of the exhibit—entertainment is."

One announced feature is a "spacearium" co-sponsored by the Government and Boeing Airplane Company. In it, the visitor will be taken on a simulated journey through outer space, making a quick pass at the sun, hovering over Mars, whizzing into and out of the rings around Saturn, and zipping through the Milky Way, with a fast peek at the moon along the way.

The Science Pavilion is designed as a five-unit complex built around a courtyard containing pools and fountains. The five arching towers at the entrance will reach heights of 90 feet, forming a vertical symbol representing man's continuing quest for knowledge.

The State of Washington is financing construction of the Century 21 Coliseum, a $4,000,000 structure which will house four acres of international exhibits purporting to show how man will work, live and play in the century ahead.

Here, visitors will see models of the cities and homes of the future, plus new concepts in transportation, industry, food production, automation, education, communications, recreation, crafts, the arts and entertainment. A honeycomb of cubed rooms will hold the displays.

"SPACE NEEDLE"—Tall tower, topped by rotating restaurant that makes a full turn every hour, is a feature attraction of the 1962 Century 21 Exposition in Seattle.

Not a fun ride or a miniature model, Seattle's monorail system is being devised to test ways of solving commuter transportation problems in densely populated regions.

The electrically powered aluminum cars, rolling quietly on rubber tires, will make the 1.2-mile run from downtown Seattle to the fair grounds in about a minute and a half. (See SNL, 80:39, July 15, 1961.) The four coaches will be able to carry 10,000 persons an hour. The double-track line will operate on a T-bar supporting system, with the trains traveling on top. A different type of monorail, suspended beneath the tracks, will travel around the grounds, making scheduled stops at key exhibit areas.

From May 2 to 5, Seattle will play host to the 13th National Science Fair-International, conducted by SCIENCE SERVICE. The more than 400 science-minded youngsters expected to take part will set up their exhibits in 38,000 square feet of floor space in the Civic Auditorium, located in the 16-block area set aside for Century 21.

President Kennedy has said he hopes to be able to officially open Century 21. Former President Eisenhower is the fair's honorary president. Dr. Wernher von Braun, German-born rocket and space expert, is honorary space chairman.

The "space age world's fair," first to emphasize future progress rather than past accomplishments, will provide Seattle with one of the nation's most fabulous civic centers. When the fair ends, most of the buildings on the site will be left intact to form the nucleus of the projected center. The coliseum, for example, will be used for conventions and sports events.

Meanwhile, with some $22,000,000 worth of construction projects currently under way, the building boom has helped offset any regional recession trends.

Some Century 21 sidelights:

The 65 art masterpieces to be shown at the Fine Arts Exhibition Hall will be insured for more than $20,000,000.

To get a representative collection of the art work of American Northwest Indians, fair officials had to import many of these anthropological treasures from Europe, where they are highly esteemed.

The bar in the "revolving restaurant" will remain stationary. The management figures that even at 360 degrees an hour, a revolving bar might be a risky proposition.

A fountain designed by two young Tokyo architects, winners in an international competition, uses streams of "sculptured water,"

electronically controlled, to create complex and varied patterns.

A state-wide project called "Operation Smile" has been launched to teach Washington State residents how to welcome tourists and "sell" points of interest to them.

The concrete poured into the coliseum building would be enough to build a sidewalk from Seattle to the state capitol at Olympia, 60 miles away.

The younger set will have access at Century 21 to "thousands of various kinds of hamburgers"—including an open faced hamburger "with a scoop of ice cream and sundae sauce on top."

• Science News Letter, 80:226 September 30, 1961

GENERAL SCIENCE

Great Increases Made In Canadian Research

▶ EVIDENCE of the great increase in university research in Canada is shown by the record support of $10,477,031 given for this purpose in 1960-61 by the National Research Council and the Medical Research Council.

The Council's report said the grants were dictated by the steadily increasing student enrollment and the resulting expansion of staff and research facilities. Awards amounted to $1,110,000 more than in 1959-60 and $7,000,000 more than in 1956-57.

Science and engineering research received the most support, $7,169,402, while medical research received $2,307,467. Awards were made to both student and university staff researchers. The balance of the total was used for publications, conferences, administration of program and other indirect support.

• Science News Letter, 80:227 September 30, 1961

PUBLIC HEALTH

Flu Vaccination Urged For Possible Outbreaks

▶ DESPITE a lack of current flu cases, an epidemic may be just around the corner. Predictions are now that Asian flu (type A) and influenza B, caused by a different virus, will hit the United States in the fall and winter of 1961-62.

No specific drug is known to cure influenza, but combined A and B vaccines are 60% to 80% effective in combating the disease.

Health officers and private physicians are being furnished by Surgeon General Luther T. Terry, U.S. Public Health Service, with current recommendations of the Surgeon General's Advisory Committee on Influenza.

Immediate vaccination for persons over 65 years of age, for pregnant women and for those with cardiovascular, pulmonary and other chronic diseases, including diabetes, are advised.

Those who have not had any previous shots should have a second injection in two months. Some good can be obtained within a week from the first shot.

Prediction of A and B outbreaks is based on previous cycles. Both types of flu were prevalent in England last year. In 1951, when a similar epidemic struck that country, it reached the U.S. the following year.

In the period 1957-60, 86,000 deaths in excess of the normally expected number occurred in this country. More than two-thirds of these deaths occurred in persons 65 or older.

Influenza may be merely a terminal event in an already debilitated patient, but influenza and its accompanying pneumonia may kill a person in active, productive life, although within an older age group, or with definite but compensated chronic disease.

The adult dosage recommended is one cubic centimeter of polyvalent vaccine injected under the skin. Persons previously immunized should be reinoculated with a single booster shot of one cc. each year.

• Science News Letter, 80:227 September 30, 1961

BUSINESS ADMINISTRATION

Advance Training Helps Handicapped Tradesmen

▶ A HANDICAPPED person stands a better chance of operating a small business successfully if he gets thorough training before the business is established and expert supervision afterward.

This was confirmed in a study of 150 handicapped persons running businesses in northern Alabama. The three-year study was undertaken by the Alabama School of Trades, Gadsen, using $47,607 in grants from the U.S. Office of Vocational Rehabilitation.

Those checked included 110 persons in a control group, each set up in business by the State Vocational Rehabilitation Service. Only about ten percent of the group received any preparatory training.

The 40 persons in the second group were screened and trained by School of Trades specialists, and were supervised by project personnel after the businesses opened.

Both the control group and the smaller demonstration group operated skilled trades service enterprises, retail sales outlets and agricultural projects.

Forty-three percent of the untrained control group failed in business, while only 22% of the trained demonstration group failed.

No comparable figures for failure rates among new American businesses in general are available, but a Department of Commerce study shows that 54% of new firms usually survive the first 18 months, 26% survive five and one-half years, and 19% survive ten and one-half years.

The study showed that the most important factors leading to the business success of a physically or mentally handicapped person are managerial ability, emotional stability, aggressiveness, maturity, community reputation and reliability. Age, formal education and business location are less important than personality traits.

Of the 88,000 disabled persons rehabilitated last year under state-Federal programs, about 8,000 were helped by state vocational agencies to become small businessmen.

• Science News Letter, 80:227 September 30, 1961

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ELECTRICAL CONTRACTING—Ray Ashley—*McGraw*, 284 p., illus., $10. Comprehensive manual dealing with practical methods for profitable contracting.

THE FARMER'S DILEMMA—Stanley Andrews, foreword by Norris E. Dodd—*Public Affairs Press*, 184 p., $4.50. An assessment of U.S. agriculture in this century, urging a policy of wiser land use.

FEARON'S INTRODUCTION TO BIOCHEMISTRY—William John Edward Jessop—*Academic Press*, 4th ed., 473 p., $8. Fully revised treatment of constitutive and dynamic biochemistry.

FILTRATION—George D. Dickey—*Reinhold*, 353 p., illus., $12. A modern account of solid-liquid separation in the wet processes: water, industrial products and wastes.

FUNCTIONS OF THE BLOOD—R. G. Macfarlane and A. H. T. Robb-Smith, Eds.—*Academic Press*, 635 p., illus., $16.50. Presents the biology of the blood and its cellular and noncellular components from the functional point of view in the broadest sense.

GAS CHROMATOGRAPHY ABSTRACTS, 1960—C. E. H. Knapman, Ed. with C. G. Scott—*Butterworths*, 200 p., $8.50. Contains 875 abstracts from the recent world literature on gas chromatography, with subject and author index.

GRAPHIC CHARTS HANDBOOK—Anna C. Rogers—*Public Affairs Press*, 189 p., illus., $6. Emphasis is on graphic charts and methods with wide applications in the visual presentation of statistical and other research data.

A GUIDE TO THE SELECTION, COMBINATION AND COOKING OF FOODS, Vol. 1: Selection and Combination of Foods—Carl A. Rietz—*Avi Pub. Co.*, 395 p., illus., folding charts, $15. Attempts detailed classification of foods according to their taste appeal.

INTERFACIAL PHENOMENA—J. T. Davies and E. K. Rideal—*Academic Press*, 474 p., illus., $14. On the physics of surfaces, electrostatic phenomena, adsorption at liquid interfaces, monolayers, diffusion, and disperse systems and adhesion.

JOHN AND WILLIAM BARTRAM'S AMERICA—Helen Gere Cruickshank, Ed.—*Doubleday*, 379 p., illus., paper $1.45. Selections from the writings of the early American naturalists.

LIBRARY JOURNAL'S RECOMMENDED CHILDREN'S BOOKS OF 1960-61—E. Louise Davis, Ed.—*Bowker*, 174 p., illus., paper, $3. Librarians' evaluation of 1,000 of the best juveniles, arranged by grade and subject with author-title index.

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MECHANISMS IN RADIOBIOLOGY, Vol. I: General Principles—Maurice Errera and Arne Forssberg—*Academic Press*, 534 p., illus., $16. Deals with the physical and chemical aspects of radiation effects, cytological effects, radiation genetics and mutations.

MECHANISMS OF ANTIBODY FORMATION: Proceedings of a Symposium held in Prague, May 27-31, 1959—M. Holub and J. Jarosova, Eds.—*Academic Press*, 385 p., illus., $10. General survey of the present state of immunology and the different conceptual approaches to the question of the mechanisms of antibody formation in different laboratories of the world.

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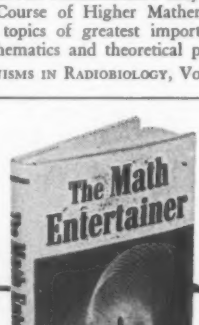

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The age of a fish can be determined by the annual growth rings on its scales.

The copeina lays her eggs out of the water on a rock, whereupon the male splashes them with water and keeps them moist until they hatch.

The tuna, probably the fastest fish, has been clocked at 30 m.p.h.

Sharks have no bones; only tough cartilages.

Certain members of the cichlid family provide mouth havens for the young: the young swim into the parents' mouth for protection until they are too large to get in.

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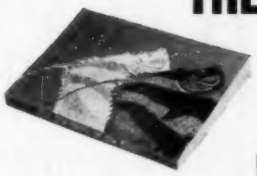

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Dr. Curtis first places the fish in its proper evolutionary position, and then tells what is known of the nervous system and the sense of pain, the function of the air bladder, digestive, breathing, excretory, and circulatory systems. The lay reader will find especially interesting the chapter on reproduction, where there is an absorbing discussion of the kinds of courtship, mating, spawning, and care of young.

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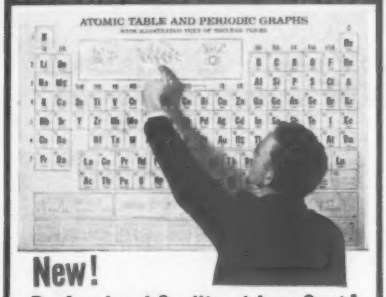

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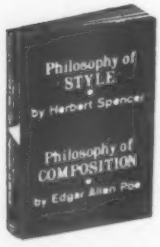

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NATIONAL GEOGRAPHIC MAGAZINES, 1888-1960, any issue. Periodical Service, Box 465-SN., Wilmington, Delaware.

INVENTION

Patents of the Week

➤ DUST-LADEN air can be purified by passing it through a field of radiant energy that destroys the dust by burning it. A low-cost, efficient purification device, patented by two Milwaukee, Wis., inventors, reportedly succeeds in utilizing radiant energy without a corresponding high increase in air temperature and the need for expensive equipment to cool the treated air.

To get this result, Adolf J. Burklin and Francis W. Lauck designed a unit that does not pass the air directly over the heating element in conventional fashion. Instead, the electrically powered energy generator is mounted inside the air passage chamber, with the heating coil housed in transparent fuse quartz and aluminum oxide, materials that are low energy absorbers.

The purifier received patent No. 2,999,930, assigned to A. O. Smith Corporation, Milwaukee.

Heat loss is further prevented by a silver-surfaced shield that reflects the energy back and forth within the chamber walls, establishing a uniform field.

When the heating element and a motor-driven fan are energized, the infrared heat energy output is absorbed by incoming dust particles and destroys them by combustion.

The unit is suitable for home use and requires only "a relatively small and inexpensive" cooling attachment, the inventors said.

Dust removal is also the purpose of an invention patented by three Californians who produced a "dust-free work bench."

A table and cabinet used for factory assembly work is supported at one end by a unit that feeds filtered air into the cabinet through a screened duct. The operator has access to the table through openings in a Plexiglas screen. The apparatus is described as "especially useful" for work on vacuum tubes, semi-conductors and ball bearings, all requiring a high degree of cleanliness during assembly.

Inventors Robert A. Abler, Los Altos, and Floyd L. Becker and David G. Clifford, Palo Alto, assigned rights to patent No. 2,999,448 to Varian Associates, Palo Alto.

The vapor of dipropargyl ether can be used to keep stored potatoes from sprouting without being absorbed by the potato and without any of the harmful toxic effects possible with dusts and sprays previously used as anti-sprouting agents, inventor Frederick A. Hessel of Montclair, N. J., claims.

His process received patent No. 2,999,746, assigned to General Aniline & Film Corporation, New York. The ether vapors are applied at a ratio of one part by weight per 1,000 parts by weight of stored potatoes.

An anti-skid sanding device, designed for installation in automobile trunk compartments, won patent No. 2,999,711 for Leonard J. Sturmer, Niagara Falls, N. Y.

Each of the two units in the trunk consists of an electric rotary blower, a funnel-shaped sand hopper and a curved pipe with the forward open end over a rear tire. When a switch is turned on, the blowers, operated from the car battery, shoot streams of sand onto the tires to prevent skidding while the wheels are rotated.

• Science News Letter, 80:230 September 30, 1961

SPACE

NAS Scientists Support Man in Space Program

➤ THE UNITED STATES should continue its push into space, the Space Science Board of the National Academy of Sciences, Washington, D. C., believes.

The Board recommended to the Administration that "scientific exploration of the moon and planets should be clearly stated as the ultimate objective of the U. S. space program for the foreseeable future."

The recommendation shows that many scientists favor space exploration. One criticism of the U. S. program for space exploration has been that it is mainly politically inspired and of little scientific value.

The Academy Board said the U. S. should stress that it will continue to aim at scientific understanding of space, the problems of man in space and of using space science for man's welfare.

• Science News Letter, 80:230 September 30, 1961

AERONAUTICS

Aerobatic Team Shows Diamond T-Formation

See Front Cover

The Blue Diamonds, leading aerobatic team of Britain's Royal Air Force, show a new formation, the Diamond T, presented at the annual show of British aircraft and flying at Farnborough, England.

The Blue Diamonds, seen on the cover of this week's SCIENCE NEWS LETTER, are not only air acrobats but also a fully operational front line unit.

• Science News Letter, 80:230 September 30, 1961

Questions

ASTRONOMY—How many miles above the earth are polar radiation "caps" believed present? p. 219.

SPACE—How many U. S. satellites are now in earth orbit? p. 221.

Photographs: Cover, British Information Services; p. 219, International Telephone and Telegraph Corporation; p. 221, National Aeronautics and Space Administration; p. 223, Aeronutronic, Ford Motor Company; p. 226, Century 21 Exposition; p. 232, Dennix Products Co.

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SOME OF THE CONTENT OF THE EXPERIMENTS: If you flip a coin 50 times, what will happen? If you roll 2 dice, what will happen? If you roll 30 dice and do that 40 times, what will happen? How often will you get 5 sixes when you roll 30 dice? How often will you get 10 sixes when you roll 30 dice? How will raindrops be distributed? How do you use the frequency of letters to solve a cryptogram? If you have 20 black beads and 10 white beads in a sampling box, what are you likely to get in ten samples? If you have 20 black beads and 10 white beads in one sampling box and 25 black beads and 5 white beads in another sampling box, are you likely to be able to tell the boxes apart if you sample twenty times? How random is random? Can a person name 100 digits randomly out of his head? How do you measure departure from randomness?

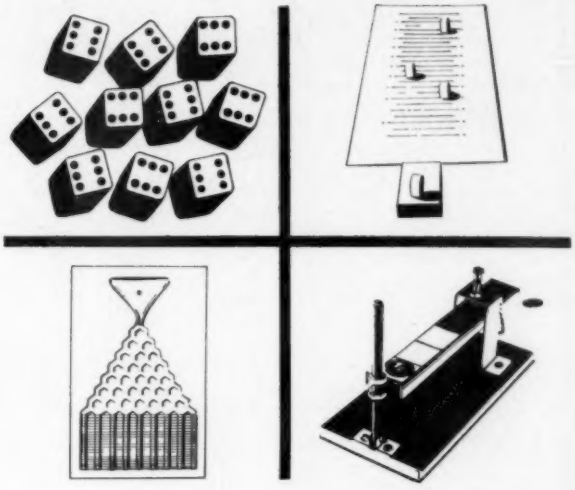
STATISTICAL DISTRIBUTIONS DISCUSSED IN THE KIT AND EXPERIMENTS: Uniform Distribution in one and two dimensions; Binomial Distribution; Normal Distribution; Chi-Squared Distribution; Poisson Distribution; Multinomial Distribution.

From the Instruction Book's preface by Dr. Frederick Mosteller, Professor of Mathematical Statistics, Department of Statistics, Harvard University, Cambridge, Mass.:

. . . Some may feel that this sort of material is only for the youth who is quick at science and mathematics, and certainly such a youngster will profit mightily. But it is not so well known that children, retarded in the mathematical areas, brighten up when presented mathematical tasks derived from experiments they have executed themselves . . .

In all the talk about science and mathematics, let's not forget that experimentation with mathematical ideas is fun. And hours and hours of such instructive fun are in the Berkeley book and lab. How do I know? In preparing this introduction, I have been greatly hampered by my not-very-studious 14-year old who busily instructs me in the use of all these materials.

Now if you'll excuse me, I have a new theory I'd like to try on the coin-flipping machine. Have fun!



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New Ideas and Gadgets

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 1111. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

CAFE TABLE LEG is a do-it-yourself pedestal base to which a table top can be attached. Having a center post of polished and lacquered satin brass and legs and base of finished or unfinished wood, it is easily assembled. The leg comes in three heights and the base in three sizes. Table tops of different shapes and sizes are available separately.

• Science News Letter, 80:232 September 30, 1961

SILVER OXIDE BATTERY is no larger than a pea and reportedly has higher working voltage and low temperature performance eight times better than other types. Long lasting, it is not affected by temperature changes in weather and its unique sealing system prevents leakage. Sizes to power electric wrist watches and existing hearing aids will soon be available.

• Science News Letter, 80:232 September 30, 1961

AUTO ALARM UNIT only 1¾ pounds in weight and 6 x 2 x 3 inches in size can be installed under the hood of any automobile. Wired to the horn and set by a flip of the switch, it gives off a piercing blast at the slightest tampering. The alarm automatically shuts off 15 seconds after tampering has stopped.

• Science News Letter, 80:232 September 30, 1961

FLOWER ARRANGEMENT of polyethylene daffodils, lilies-of-the-valley and bamboo leaves, shown in the photograph, is contained in a milk glass pedestal bowl. The long-lasting natural scent of the flowers reproduced in the 15-inch-tall arrangement brings year-around spring into the home.

• Science News Letter, 80:232 September 30, 1961

SHOE EJECTOR enables a person to remove galoshes and boots without bending over or dirtying the hands. Made of natural finish cherrywood trimmed in red, it is 4 x 12 inches in size and folds up neatly for storage. Suitable for the hall, clubs and hospitals.

• Science News Letter, 80:232 September 30, 1961

MECHANIC'S STETHOSCOPE similar to a doctor's stethoscope locates car trouble by sound. It has an overall length of 43 inches, including a 7½-inch contact rod at its end. By shifting the sound contactor from place to place and comparing sounds, the exact location of mechanical trouble can be quickly pinpointed.

• Science News Letter, 80:232 September 30, 1961

FIVE SENSES MODELS for sight, smell, touch, taste and hearing come in individual kits, easily assembled and twice life-size. The human eye model features the life movement of eye and muscle; the ear kit, unique see-through properties. Inexpensive, and including anatomy charts, the five kits are suitable for schools or individuals.

• Science News Letter, 80:232 September 30, 1961

SEAL-LOCK FLUORESCENT DETECTOR for locating surface cracks, flaws, defects or porosity in metallic and nonmetallic solids uses water-soluble materials. A black light source is used to activate the fluorescent materials which appear as glowing lines or spots. Inspection takes only three to five minutes.

• Science News Letter, 80:232 September 30, 1961

Nature Ramblings

➤ IN DARK and secure tunnels, the last bumblebee queens of the season are digging themselves into their hibernating burrows, where they will sleep until April.

Just a short time ago, there was a flurry of activity in the bumblebee world, for during late summer and early autumn the young queen makes her nuptial flight. Like the honeybee queen, she leaves her parental home unattended, finds her mate and almost immediately dismisses him as being of no further biological consequence.

But after the mating, quite unlike the honeybee which returns to the home hive, the bumblebee queen goes through a solitary phase. This occurs when she digs her shallow burrow in the ground and settles down for the long, death-like sleep of hibernation.

When spring comes she emerges from the soil and finds a new homesite—frequently in an abandoned burrow of some other animal—where she digs out a chamber somewhat larger than her winter bedroom. On the floor of the burrow she builds wax containers and fills them with food.

Sleep of the Bumblebee

The bumblebee queen then lays her first few eggs. And when the hungry grubs hatch from them, she becomes more zealous than ever before. Only when this first squad of workers is mature enough to seek food for the community does she retire and devote herself fully to the business of egg laying.

• Science News Letter, 80:232 September 30, 1961

Do You Know?

Duodenal *ulcer* occurs as high as 40% more frequently among individuals with blood group O than in those belonging to the other ABO groups.

Speed is the major cause of accidents, not only for automobiles but for ships.

Antibiotics are being used to protect *honeybees* from attacks of disease.

Fusion occurs when light atomic nuclei collide, release energy and form heavier atoms.

A newborn *baby* develops certain postural and tonic reflexes as a result of gravity which determine the nature of his motor reactions for the rest of his life.

Ancient man mined large quantities of *gypsum* minerals from caves in Mammoth Cave National Park area 3,000 years ago.

• Science News Letter, 80:232 September 30, 1961